

2 MAR 2005

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



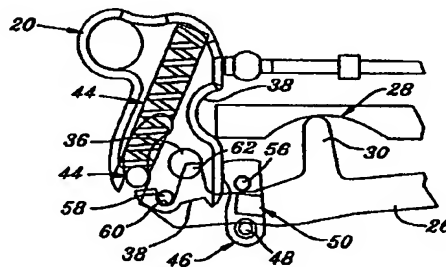
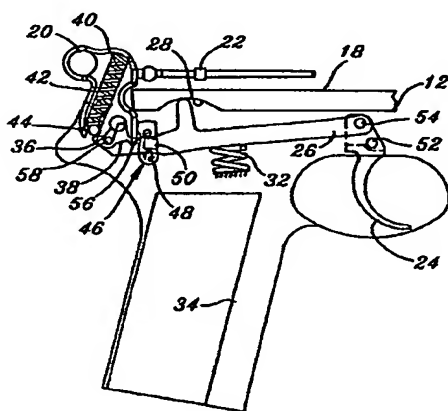
(43) International Publication Date
22 April 2004 (22.04.2004)

PCT

(10) International Publication Number
WO 2004/033983 A2

- (51) International Patent Classification⁷: F41C (74) Agent: CRUTCHER, William, C.; McCormick Paulding & Huber, LLP, CityPlace II, 185 Asylum Street, Hartford, CT 06103 (US).
- (21) International Application Number: PCT/US2003/030290 (81) Designated States (*national*): AE, AU, BA, BR, BZ, CA, CN, CO, DZ, EC, GE, HR, IL, IN, JP, KE, KR, LT, LV, MA, MG, MK, MX, NO, NZ, OM, PH, PL, SD, SG, SY, TN, UA, US, UZ, VN, YU, ZA.
- (22) International Filing Date: 26 September 2003 (26.09.2003) (25) Filing Language: English (84) Designated States (*regional*): Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR).
- (26) Publication Language: English
- (30) Priority Data: 60/416,030 3 October 2002 (03.10.2002) US Published: — without international search report and to be republished upon receipt of that report
- (71) Applicant and (72) Inventor: MOORE, Wildey, J. [US/US]; 45 Angevine Road, Warren, CT 06794 (US).
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: DOUBLE ACTION, HAMMER TRIGGER MECHANISM FOR A FIREARM



(57) Abstract: Double action, hammer trigger mechanism for a semi-automatic firearm (10) with a spring loaded slide (12) having a cam surface (28), a pivoting sear (46) to hold the hammer (20) in a cocked position and a transfer bar (26) connected to a pivot pin (54) on the trigger (24). The transfer bar has a cam finger (30) to move the transfer bar down when the slide moves in a rearward direction during firing. When the sear is holding the hammer cocked, a second finger (62) on the transfer bar is arranged to engage a single action let-off pin (56) on the sear and pivot the sear when the trigger is pulled so as to release the hammer. The cam finger also moves the transfer bar down when the slide is stationary and the trigger is operated. The transfer bar has a notch (60) receiving a double action let-off pin (58) on the hammer to cause the transfer bar to pivot the hammer in a cocking direction as the trigger is pulled. This motion moves the transfer bar notch away from the double action let-off pin to release the hammer when the trigger is pulled to a double action let-off position before the hammer reaches the cocked position.

WO 2004/033983 A2

4 / prts

WO 2004/033983

PCT/US2003/030290

**DOUBLE ACTION, HAMMER TRIGGER MECHANISM
FOR A FIREARM**

Cross Reference to Related Applications

5 This application claims the benefits of prior filed, co-pending U.S.
provisional patent application Serial No. 60/416,030 filed on October 3, 2002.

Technical Field

10 This invention relates to an improved double action, hammer trigger
mechanism for a firearm. More particularly, it relates to an improved
mechanism for releasing the hammer when the trigger operates a known type
of transfer bar operating means to either release the hammer at a single action
let-off position, or to draw back the hammer and release it when the trigger is
pulled to a double action let-off position.

15 **Background Art**

A firearm, and in particular an autoloading or automatic firearm, is
equipped with an external hammer that can be cocked to the rear and engaged
with a sear and then tripped by squeezing the trigger which engages the sear by
means of linkage releasing its engagement to the hammer (single action let-
20 off). Alternatively, the hammer can be drawn to the rear for release and firing
by squeezing the trigger without first cocking the hammer. This is
accomplished through the linkage system engaging the hammer with the trigger
for the aforementioned purpose; pulling the hammer rearward and releasing it
before it can be engaged by the sear (double action let-off).

25 This invention relates to firearms functioning in the aforementioned
manner incorporating a hammer spring, usually located in an area behind the
magazine well in the frame and consisting of various components to
accomplish the single action and double action let-offs. Historically, it is not
recommended that anyone but an accomplished gunsmith work on these

mechanisms as they are complicated and improper assembly or disassembly is very likely to occur. The invention addresses these issues by accomplishing the same objectives but with basic components that anyone with an aptitude for mechanics can easily understand.

5 Accordingly, one object of the present invention is to provide a simplified double action, hammer trigger mechanism for a firearm.

 Another object of the invention is to provide an improved single action mechanism for releasing a sear engagement with a cocked hammer using a transfer bar connected to the trigger.

10 Another object of the invention is to provide an improved double action let-off mechanism using a transfer bar connected to the trigger for pulling back and releasing the hammer before the sear engages the hammer.

 Still another object of the invention is to provide an improved hammer trigger mechanism suitable for an automatic or semi-automatic firearm of the type having a slide operated with a recoil spring for automatic or semi-
15 automatic firing.

Disclosure of Invention

20 An improved double action, hammer trigger mechanism for a firearm of the type having a frame, a barrel for receiving a cartridge, a slide or bolt arranged to move longitudinally between a forward and a rearward position with respect to the barrel, the slide or bolt defining a cam surface, a firing pin longitudinally slidable in the slide or bolt so as to strike the cartridge, a hammer arranged to pivot about a first pivot point on the frame, the hammer defining a sear notch,
25 spring biasing means urging the hammer toward the firing pin, a spring-loaded sear arranged to pivot about a second pivot point on the frame, the sear including a lip for cooperating with the sear notch to hold the hammer cocked when the hammer is pivoted, a trigger arranged to pivot about a third pivot point on the frame, the trigger having a trigger pivot pin thereon which is

disposed so as to move in a forward direction when the trigger is pulled, a transfer bar having a first end connected to the trigger pivot pin, the transfer bar including a first finger cooperating with the cam surface when the slide is in a forward position, and a transfer spring biasing the first finger toward the cam surface, the improvement comprising a single action let-off pin disposed on the sear, the transfer bar further including a second finger arranged to engage the single action let-off pin and pivot the sear when the trigger is pulled so as to release the hammer when the sear is holding the hammer cocked, a double action let-off pin disposed on the hammer, the transfer bar defining a notch disposed to receive the double action let-off pin to cause the transfer bar to pivot the hammer in a cocking direction against the spring biasing means when the trigger is pulled to an intermediate position, the transfer bar first finger cooperating with the slide cam surface to move the transfer bar notch away from the let-off pin to release the hammer when the trigger is pulled to a double action let-off position.

Brief Description of Drawings

The invention will be better understood by reference to the following description, taken in connection with the accompanying drawings, in which:

Fig. 1 is a side elevational drawing, partly in section, of a semi-automatic firearm,

Fig. 2 is a stylized side elevational drawing of the uncocked hammer trigger mechanism,

Fig. 2a is an enlarged view of a portion of the mechanism of **Fig. 2**,

Fig. 3 is a side elevational drawing of the trigger mechanism according to **Fig. 2**, but with the hammer cocked for single action let-off,

Fig. 4 is a simplified drawing of the major components of the trigger mechanism commencing double action hammer rotation,

Fig. 5 is a side elevational drawing of the same mechanism at a later

stage of double action movement, and

Fig. 6 is a side elevational view of the mechanism at the double action let-off position.

5 **Best Mode for Carrying Out the Invention**

Referring now to Fig. 1 of the drawing, the invention is described as embodied in a semi-automatic firearm of the type using a spring-loaded cartridge magazine (not shown) and having a reciprocating slide 12 adapted to move from a forward position in a rearward direction against a recoil spring (not shown) when a cartridge 14 is fired. During the rearward movement, the shell of cartridge 14 is ejected, and during the return forward movement, a new cartridge is stripped from the magazine and inserted into the bore of a barrel 16 in a manner well known in the art. Slide 12 is reciprocable in tracks upon a frame 18. A hammer 20 is pivotably mounted on frame 18 to strike a firing pin 22, which is longitudinally slidable in the slide 12 so as to strike the rear of cartridge 14. A trigger 24 is pivotably mounted in the frame and connected to push or pull a transfer bar 26. Slide 12 includes a cam surface 28, which cooperates with a first finger 30 to raise or lower the end of transfer bar 26 when the transfer bar is pushed or pulled longitudinally by the trigger 24. The foregoing list of elements describes a construction known in the prior art. The invention relates to improvements in the linkages in the vicinity of arrow A, as illustrated in the following figures.

Referring to Fig. 2 of the drawing, the hammer trigger mechanism is illustrated at 0° of trigger rotation and 0° of hammer rotation. Transfer bar 26 is biased upwardly by a transfer spring 32 of a suitable type located in a magazine well 34. Hammer 20 is arranged to pivot about a pin defining a first pivot point 36 on the frame. The hammer defines a sear notch 38 and is spring biased by a known type of spring biasing arrangement having a spring 40 compressed in a hammer spring well 42 by a hammer spring compression pin

44.

A spring-loaded sear 46 is arranged to pivot about a pin defining a second pivot point 48 against a compression spring located in a sear spring well 50. A spring-loaded sear is well known and the spring is not illustrated in order not to obscure the details of the invention.

The trigger 24 is arranged to pivot about a pin defining a third pivot point 52 on the frame, and is pivotably connected to transfer bar 26 by a trigger pivot pin 54. When the trigger 24 is pulled, the trigger pivot pin pulls the transfer bar 26 in a forward direction.

In accordance with the present invention, sear 46 is equipped with a single action let-off pin 56, and hammer 20 is equipped with a double action let-off pin 58. These are so disposed and arranged to cooperate with a notch 60 and a second finger 62, respectively on the transfer bar 26 (see Fig. 2a).

Reference to the enlarged scale drawing of Fig. 2a, it is seen that the end of transfer bar 26 defines notch 60 disposed to receive the double action let-off pin 58. Further, the transfer bar 26 defines a second finger 62, which is arranged to engage the single action let-off pin and pivot the sear when the trigger is pulled.

Referring to Fig. 3 of the drawing, the hammer trigger mechanism is shown for 49.5° of trigger rotation and 60° of hammer rotation. Hammer 20 is shown cocked for single action let-off, and is being held in place by sear 46. Trigger 24 has been pulled, causing transfer bar 26 to be pulled forwardly and downwardly as dictated by the cam surface 28. The second finger 62 on the transfer bar is so positioned and dimensioned to engage the single action let-off pin 56. This causes sear 46 to pivot and release hammer 20 to strike firing pin 22.

Figs. 4 through 6 illustrate the double action let-off sequence. Referring to Fig. 4 of the drawing, the hammer trigger mechanism is shown at 30° of trigger rotation and 34.2° of hammer rotation. As trigger 24 is pulled, the first

finger 30 begins to force transfer bar 26 in a downward direction against transfer spring 32, as transfer bar 26 moves forward. The notch 60 in the transfer bar engages the double action let-off pin 58 and is starting to cock hammer 20 against the compression spring 40 in hammer spring well 42.

5 Referring to Fig. 5 of the drawing, trigger 24 has been drawn to a 40° rotation position to further rotate the hammer to a 35° position against spring 40. Cam surface 28 continues to move in a downward direction against transfer spring 32. This moves notch 60 in a direction away from the double action let-off pin 58.

10 Finally, referring to Fig. 6 of the drawing at double action let-off position, the trigger has been pulled to 55° trigger rotation, and the hammer to 49.2° hammer rotation. The sear has not yet engaged the hammer to hold it in a cocked position (Fig. 3). The first finger 30 has lowered transfer bar 26 to the point where notch 60 no longer holds the double action let-off pin 58. This
15 releases hammer 20 to strike firing pin 22.

The invention has been described for a semi-automatic firearm with a recoil slide and the cam surface disposed in the slide when the slide is in the forward position. The invention is equally applicable to a firearm with a bolt instead of a slide mechanism. In this case, the bolt is closed to hold the
20 cartridge in the chamber. When the bolt is at the forward position, a cam surface similar to cam surface 28 is so disposed in the bolt to cooperate with a transfer bar. The modification of the invention to apply to a firearm with a bolt will be readily understood by one skilled in the art.

25 While there has been described what is considered to be the preferred embodiment of the invention, other modifications will occur to those skilled in the art. It is desired to secure all such modifications as fall within the true spirit and scope of the invention.

Claims

1. Improvement in a double action, hammer trigger mechanism for a firearm of a known type having a frame, a barrel for receiving a cartridge, a slide arranged to move longitudinally between a forward and a rearward position with respect to said barrel, said slide being spring-loaded in a forward direction and adapted to move in a rearward direction when the cartridge is fired, said slide defining a cam surface, a firing pin longitudinally slidable in the slide so as to strike the cartridge, a hammer arranged to pivot about a first pivot point on the frame, said hammer defining a sear notch, spring biasing means urging said hammer toward the firing pin, a spring-loaded sear arranged to pivot about a second pivot point on the frame, said sear including a lip for cooperating with the sear notch to hold the hammer cocked when the hammer is pivoted against said spring biasing means, a trigger arranged to pivot about a third pivot point on the frame, said trigger having a trigger pivot pin thereon that is disposed so as to move in said forward direction when the trigger is pulled, a transfer bar having a first end connected to said trigger pivot pin, said transfer bar including a first finger cooperating with said cam surface when the slide is in a forward position, and a transfer spring biasing the first finger toward said cam surface, **said improvement being characterized by:**
- 20 a single action let-off pin disposed on said sear,
 said transfer bar further including a second finger arranged to engage said single action let-off pin and pivot the sear when the trigger is pulled so as to release the hammer when the sear is holding the hammer cocked,
- 25 a double action let-off pin disposed on said hammer,
 said transfer bar further defining a transfer bar notch disposed to receive said double action let-off pin so as to enable said transfer bar to pivot the hammer in a cocking direction against said spring biasing means when the trigger is pulled to an intermediate position, said

transfer bar first finger being arranged to cooperate with the slide cam surface to move said transfer bar notch away from the double action let-off pin to release the hammer when the trigger is pulled further to a double action let-off position.

5

2. The improvement according to Claim 1, wherein said transfer bar has its first end pivotably mounted on said trigger pivot pin and extends in a rearward direction beneath said slide, and wherein said first finger extends laterally therefrom into engagement with said cam surface on the slide, said second
10 finger being spaced from the first finger to receive said single action let-off pin therebetween and located to be proximate the single action let-off pin when the hammer is cocked.

3. The improvement according to Claim 1, wherein said transfer bar has its
15 first end pivotably mounted on said trigger pivot pin and extends in a rearward direction beneath said slide, and wherein said first finger extends laterally therefrom into engagement with said cam surface on the slide and said cam surface is contoured to pivot the transfer bar away from the slide as the trigger is pulled, said transfer bar notch being shaped to hold said double action let-off
20 pin therein to move the hammer toward a cocked position as the trigger is pulled and to release the double action let-off pin therefrom before the hammer reaches the cocked position.

4. The improvement according to Claim 1, wherein said transfer bar
25 extends alongside said sear and wherein said single action let-off pin comprises a pin disposed on said sear and extending parallel to said second pivot point and over the transfer bar between said first and second fingers.

5. The improvement according to Claim 1, wherein said transfer bar

extends alongside said hammer and wherein said double action let-off pin comprises a pin disposed on said hammer and extending parallel to said first pivot point and over the transfer bar in substantial alignment with said transfer bar notch.

5

6. A transfer bar for a double action hammer trigger mechanism in a firearm, wherein said transfer bar comprises a longitudinal bar having a first end and a second end, said first end defining a pivot hole therein, a first finger extending in a lateral direction from the transfer bar and having a rounded end, a second finger spaced from the first finger on the side thereof opposite said pivot hole, said second finger extending in said lateral direction and shorter than the first finger, said transfer bar defining a transfer bar notch on said second end thereof facing in said lateral direction.

10

1/4

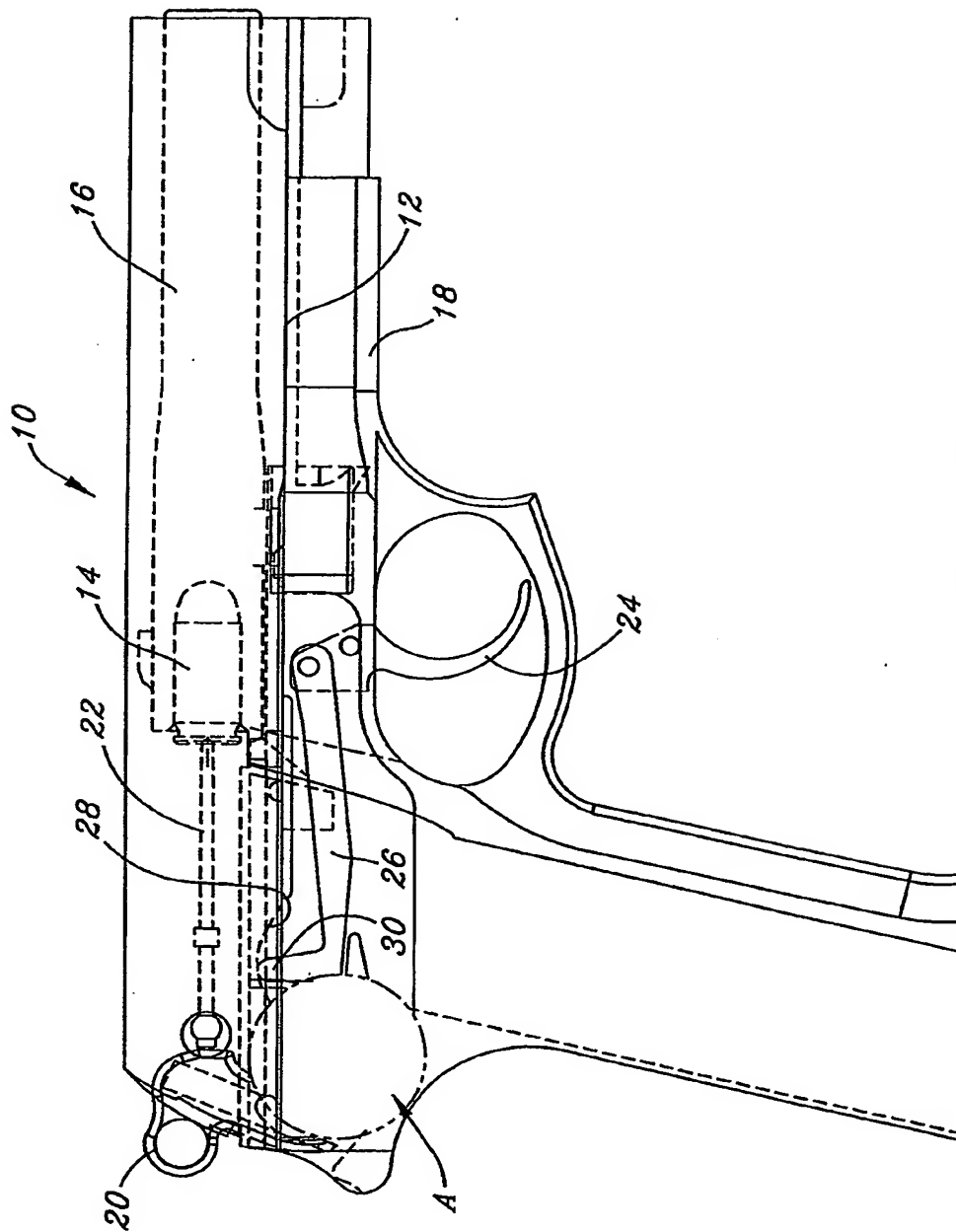


Fig. 1 (Prior Art)

2/4

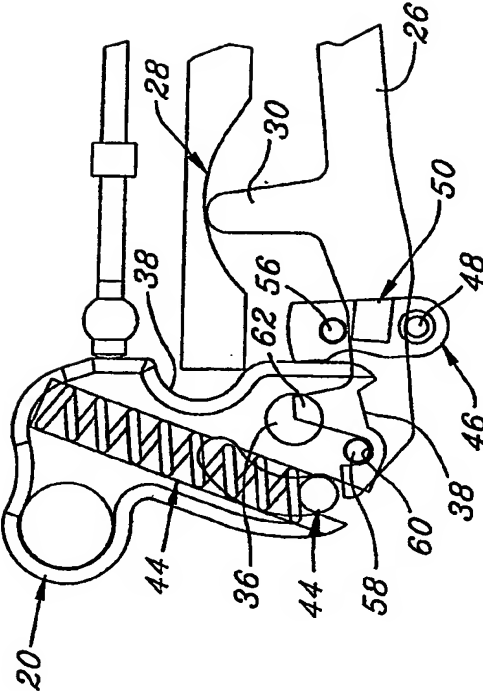


Fig. 2a

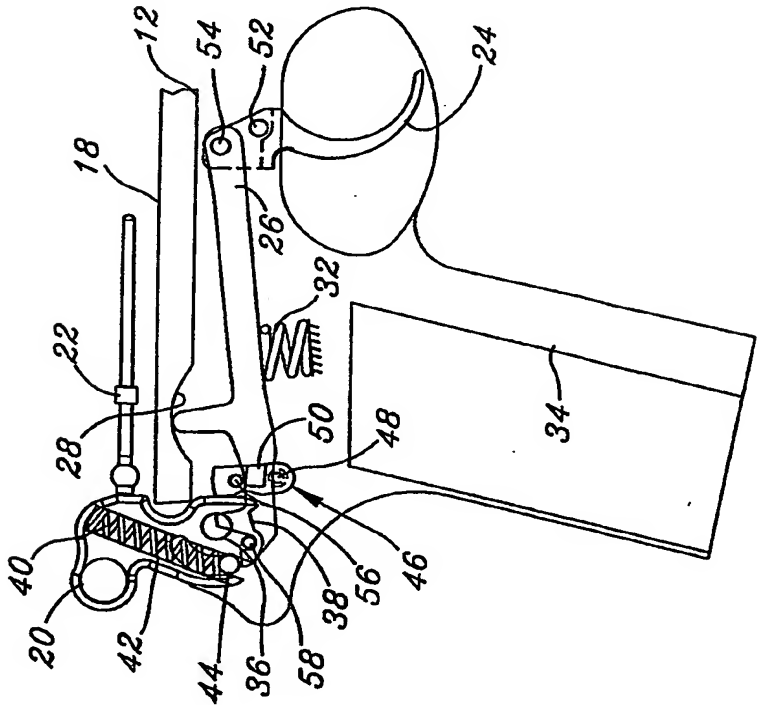


Fig. 2

3/4

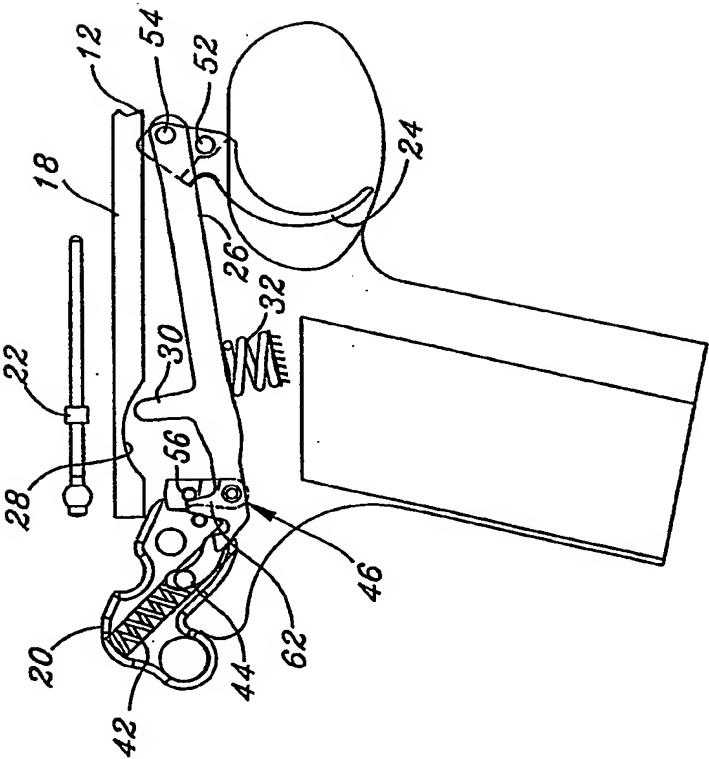


Fig. 3

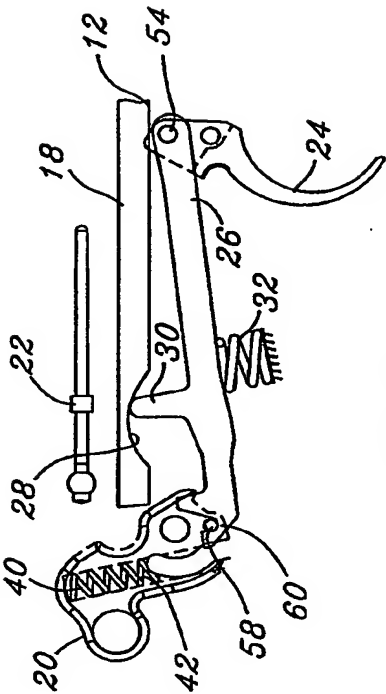


Fig. 4

4/4

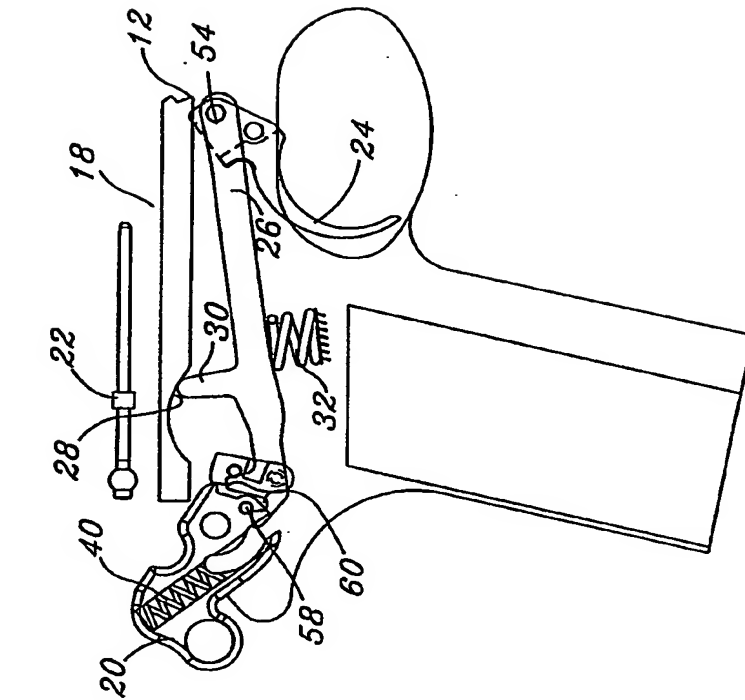


Fig. 5

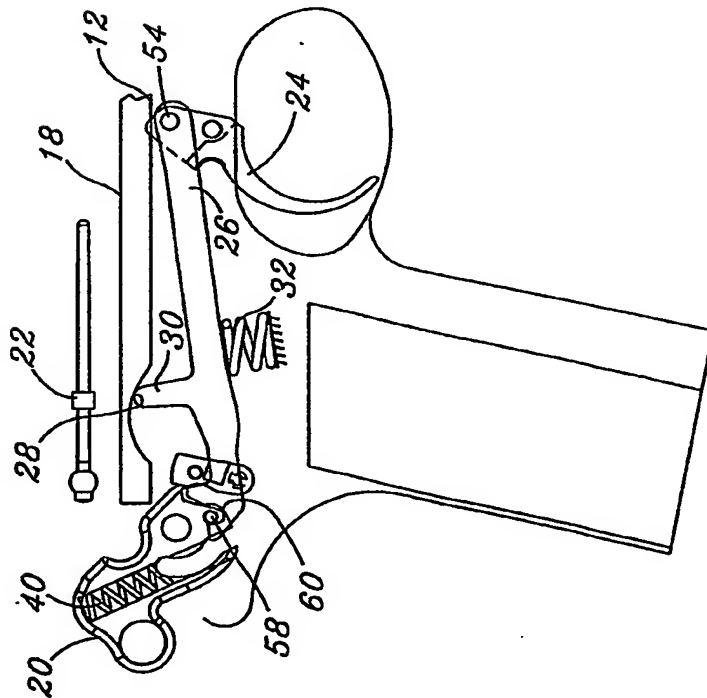


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/30290

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : F41A 19/44, 19/48

US CL : 42/69.03

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 42/69.03, 65; F41A 19/12, 19/14, 19/42, 19/44, 19/47, 19/48

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3,722,358 A (SEECAMP) 27 March 1973 (27.03.1973), column 3 line 21-column 9 line 51.	1-6
A	US 2001/0042332 A1 (GERING et al) 22 November 2001 (22.11.2001).	
A	US 5,400,537 A (MELLER et al) 28 March 1995 (28.03.1995).	
A	US 5,426,880 A (RUGER et al) 27 June 1995 (27.06.1995).	
A	US 4,428,138 A (SEECAMP) 31 January 1984 (31.01.1984).	
A	US 5,216,195 A (TUMA) 01 June 1993 (01.06.1993).	
A	US 5,386,659 A (VAID et al) 07 February 1995 (07.02.1995).	
A	US 4,275,640 A (WILHELM) 30 June 1981 (30.06.1981).	
A	US 6,457,271 B1 (VAID et al) 01 October 2002 (01.10.2002).	



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:		"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier application or patent published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

26 February 2004 (26.02.2004)

Date of mailing of the international search report

25 MAY 2004

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Facsimile No. (703) 305-3230

Authorized officer

John W. Zerr

Telephone No. (703) 308-1113

INTERNATIONAL SEARCH REPORT

PCT/US03/30290

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 550238 A1 (MELLER et al) 07 July 1993 (07.07.1993).	

INTERNATIONAL SEARCH REPORT

PCT/US03/3

Continuation of B. FIELDS SEARCHED Item 3:
USPAT, US-PGPUB, EPO, JPO, DERWENT
search terms: firearm, pistol, double, action, transfer, trigger, bar

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under Article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article," "Rule" and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended ?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Preliminary Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When ? Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments ?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How ? Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments ?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.